

Forms of Energy

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CHAPTER

1

Forms of Energy

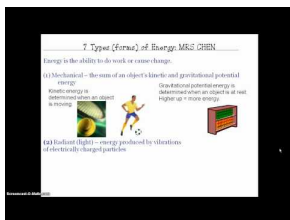
- Identify and describe different forms of energy.



This musician's electric guitar wails at a concert, as colored lights wash over the band. It's hot on stage because of the lights, but they really add to the show. The fans are thrilled and screaming with excitement. The exciting concert wouldn't be possible without several different forms of energy. Do you know what they are?

Introducing Forms of Energy

Energy, or the ability to cause changes in matter, can exist in many different forms. Energy can also change from one form to another. The photo above of the guitar player represents six forms of energy: mechanical, chemical, electrical, light, thermal, and sound energy. Another form of energy is nuclear energy. For an introduction to all of these forms of energy, watch this video: <http://www.youtube.com/watch?v=MZWICeFsNy0> (8:25).



MEDIA

Click image to the left or use the URL below.

URL: <http://www.ck12.org/flx/render/embeddedobject/125139>

Q: Can you find the six different forms of energy in the photo of the guitar player (See opening image)?

A: The guitarist uses *mechanical energy* to pluck the strings of the guitar. He gets the energy he needs to perform from *chemical energy* in food he ate earlier in the day. The stage lights use *electrical energy*, which they change to *light energy* and *thermal energy* (commonly called heat). The guitar produces *sound energy* when the guitarist plucks the strings.

Seven Forms of Energy

The different forms of energy are defined and illustrated below. For an interactive animation about different forms of energy, visit this URL: <http://blip.tv/gatm/different-types-of-energy-647820> .

1. Mechanical energy is the energy of movement. It is found in objects that are moving or have the potential to move.



FIGURE 1.1

This drummer has mechanical energy as he moves the drumsticks to hit the drums and cymbals. The moving drumsticks also have mechanical energy, but they would have mechanical energy even if they weren't moving. That's because they have the potential to fall when the drummer is holding them above the floor. This potential energy is due to gravity.

2. Chemical energy is energy that is stored in the bonds between the atoms of compounds. If the bonds are broken, the energy is released and can be converted to other forms of energy.



FIGURE 1.2

This portable guitar amplifier can run on batteries. Batteries store chemical energy and change it to electrical energy.

3. Electrical energy is the energy of moving electrons. Electrons flow through wires to create electric current.

4. Electromagnetic energy is energy that travels through space as electrical and magnetic waves. The light flooding the stage in the **Figure 1.3** is one type of electromagnetic energy. Other types include radio waves, microwaves, X rays, and gamma rays.

5. Thermal energy is the energy of moving atoms of matter. All matter has thermal energy because atoms of all matter are constantly moving. An object with more mass has greater thermal energy than an object with less mass because it has more atoms.

**FIGURE 1.3**

The bright lights on this stage use electrical energy. They are wired into the electrical system of the hall. The guitars and microphone also use electrical energy. You can see the electrical cords running from them to the outlet on the floor below the musicians.

**FIGURE 1.4**

Why is this jogger sweating so much? His sweat is soaking up his shirt because he has so much thermal energy. Jogging is hot work because of the heat from the sun and the hard work he puts into his run.

6. Sound energy is a form of mechanical energy that starts with a vibration in matter. For example, the singer's voice starts with vibrations of his vocal cords, which are folds of tissue in his throat. The vibrations pass to surrounding particles of matter and then from one particle to another in waves. Sound waves can travel through air, water, and other substances, but not through empty space.

7. Nuclear energy is energy that is stored in the nuclei of atoms because of the strong forces that hold the nucleus together. The energy can be released in nuclear power plants by splitting nuclei apart. It is also released when unstable (radioactive) nuclei break down, or decay.

Q: The fans at a rock concert also produce or use several forms of energy. What are they?

A: The fans see the concert because of *electromagnetic energy* (light) that enters their eyes from the well-lit musicians on stage. They hear the music because of the *sound energy* that reaches their ears from the amplifiers. They use *mechanical energy* when they clap their hands and jump from their seats in excitement. Their bodies generate *thermal energy*, using the *chemical energy* stored in food they have eaten.

Summary

- Energy, or the ability to cause changes in matter, can exist in many different forms. Energy can also change from one form to another.
- Forms of energy include mechanical, chemical, electrical, electromagnetic, thermal, sound, and nuclear energy.

Explore More

Check your knowledge of forms of energy with the game at this URL: <http://player.discoveryeducation.com/views/hhView.cfm?guidAssetId=85592183-A6EE-42A8-8CFC-201BDE51DF1A%26skin=siemens>

Review

1. Make a table of forms of energy. In your table, list and define five of the forms of energy described in this article. Include an example of each form.
2. Identify three different forms of energy represented by the **Figure 1.5**.

References

1. Damir Z (Flickr: sidonath). [Drummers generate mechanical energy to hit drums and cymbals](#) . CC BY 2.0
2. Amplifier: Tim Walker; Battery: Emilian Robert Vicol. [Portable amplifiers have batteries that store chemical energy](#) . Amplifier: CC BY 2.0; Battery: Public Domain
3. Image copyright dwphotos, 2014. [Electrical energy is used to power these bright lights](#) . Used under license from Shutterstock.com
4. Image copyright Jackie Smithson, 2014. [Thermal energy is generated when people exercise](#) . Used under license from Shutterstock.com
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FIGURE 1.5